REMARKS

In the Office Action: claim 3 was allowed; claims 5-7, 13 and 14 were withdrawn from consideration as allegedly drawn to a nonelected species; claim 4 was rejected under 35 USC § 102(b) over JP 02-187734A; and claim 4 was rejected under 35 USC § 102(e) over USPN 5,670,091.

In response to the Office Action, claims 4 and 6-7 have been amended, and claims 5 and 13-14 have been cancelled, all without prejudice. Support for the amendments may be found throughout the application as filed, for example in the original claims and as set forth in previous amendments. No new matter is added.

Conditional Request for Telephonic Interview

A telephonic interview is conditionally requested prior to the issuance of a subsequent Office Action should any issues remain after entry of this response that would delay allowance of the claims. The undersigned may be reached at (858) 587-7658.

Withdrawal of Claims 6-7 From Consideration

Reconsideration of the withdrawal of Claims 6-7 is respectfully requested. The Office Action stated that these claims are drawn to a nonelected species. Claims 6-7 do encompass the elected species. Where m=0, X and Z are each $CR_k=CR_l$, and Da and Db are each N, it can be seen that each of claims 6 and 7 encompass the elected species. Consideration of claims 6-7 is respectfully requested.

<u>The Rejection Under 35 USC § 102(b)</u>

Claim 4 was rejected under 35 USC § 102(b) over JP 02-187734A by Sekisui Chem Ind KK ("Sekisui"). The publication was alleged to disclose "compounds reading on those employed in the claimed methods for use in semiconductor lasers. The step of two photon absorption would have been inherent to the Sekisui Chem Ind KK compounds." This rejection is traversed. Nothing in Sekisui teaches or suggests multiphoton absorption. Additionally, it is not apparent from a translated abstract that Sekisui did use the described compound in a laser; if the Examiner possesses a translated copy of Sekisui, a copy is requested.

Anticipation requires that all claim elements be present in a single reference. Anticipation by inherency requires that each claim element not explicitly taught must necessarily be present in that reference. The Patent Office bears the burden of showing that an allegedly inherent property is necessarily present in the cited reference (MPEP 2112):

> "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (overturning inherency rejection unsupported by factual basis or cogent scientific reasoning; citations omitted, emphasis in original).

> "To establish inherency, the extrinsic evidence `must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted).

Claim 4 recites in part:

> "A method for preparing a compound in an electronically excited state, comprising the steps of:
>
> a) exposing a compound having the formula D_1-Π-D_2 ...; and
>
> b) converting said compound to a multi-photon electronically excited state upon simultaneous absorption of at least two photons of said radiation by said compound, wherein the sum of the energies of all of said absorbed photons is greater

> than or equal to the transition energy from a ground state of said compound to said multi-photon excited state and wherein the energy of each absorbed photon is less than the transition energy between said ground state and the lowest single-photon excited state of said compound and is less than the transition energy between said multi-photon excited state and said ground state ...."

Claims 3 and 5-7 contain similar limitations.

No teaching of Sekisui has been cited regarding converting the described compound to a multi-photon excited state upon simultaneous absorption of at least two photons where the energy of each absorbed photon is <u>less than</u> the transition energy between the ground state and the lowest single-photon excited state of the compound. Nor does the Office Action provide any evidence or reasoning why such steps would necessarily be present in Sekisui.

Sekisui describes in the abstract the compound 1,3-bis[2-(4-dimethylaminophenyl)ethenyl] benzene, its preparation and exhibition of nonlinear optical properties. That a material exhibits nonlinear optical properties thus does not relate in any way to two photon absorption. A nonlinear optical material is one in which input light energy does not linearly correspond to output light energy as the intensity of the input light increases. This property is only true for certain materials, and results from charge polarization induced in the material by an intense light source, causing the generation of a second harmonic having twice the frequency of the input light and half the wavelength. Note that this does <u>not</u> involve multiple photons, but rather the production of some output photons with a doubled frequency.

Similarly, assuming *arguendo* that Sekisui deals with use in a laser, the use of a compound in a laser does not imply the use of two-photon absorption. A laser relies on initial excitation of electrons to an excited state, either electrically or through an optical pump. As the electrons decay from the excited state, they emit radiation (<u>single</u> photons) characteristic of this transition (having an energy equal to the difference in electron states). Certain of these photons

are then reflected by a mirror to again strike the excited population. When one of these photons then strikes another already excited electron, the input photon is not absorbed but stimulates the excited electron to decay and emit a synchronized second photon, having the same wavelength and moving in the same direction at the same time as the input photon and having the exact same energy. As this occurs repeatedly during passages of photons reflected by mirrors at both ends of the excitation chamber, a synchronized population of photons with a discrete energy is created.

Lasers thus rely on the electrons in the material already being in an excited state in order to create light amplification; if the majority of electrons are not in the desired excited state when struck by a desired photon, instead of being stimulated to emit a second photon, they will absorb the input photon. No amplification will occur.

Materials used for lasers do not need to be capable of multiple-photon absorption, and that property is not one which would find use in laser operation. The operation of a laser achieves light amplification through use of single photons of a discrete energy; two photons of less than that energy would not be amplified by a laser. Nor would one want to optically pump a laser through the use of two-photon absorption. Two-photon absorption occurs in only a narrow focused area of an intense beam due to the high photon flux needed to achieve simultaneous absorption, and thus would not be an efficient way to optically pump a lasing material into the excited state. See Appendix A, demonstrating the use of the focused laser on the left to produce only a discrete point of two photon absorption in the solution, whereas the laser above to the right demonstrates single-photon absorption in the solution with a much larger area of excitation.

Thus, Sekisui's alleged reference to use of their compound in a laser has no bearing on the claimed method involving simultaneous two photon absorption. Furthermore, there is no

indication from the abstract of Sekisui that the inventors had shown that their material was capable of two-photon absorption or that they were using this property. Two-photon absorbing materials were desirable at the time Sekisui was filed. It is not plausible that the inventors noticed such properties and failed to discuss them in the abstract.

Because there is no evidence that any two-photon absorbing properties of the material in Sekisui were identified or utilized, and because neither a laser nor a nonlinear optical material requires multiple photon absorption for operation, Sekisui cannot inherently anticipate the claimed methods involving multiple photon absorption. Withdrawal of this ground of rejection is respectfully requested.

The Rejection Under 35 USC § 102(e)

Claim 4 was rejected under 35 USC § 102(e) over USPN 5,670,091 ("Marder"). This rejection is also traversed.

Marder was said to disclose using compounds in nonlinear optical devices employing laser energy at col. 7 lines 51 et seq. The compounds were said to read on the compounds of Claim 4. No specific compounds were identified.

As described above with regards to Sekisui, neither nonlinear optics nor lasers necessarily require (or utilize) two photon absorption, and no other portion of Marder has been cited for allegedly inherently teaching two-photon absorption. Thus Marder does not inherently teach or suggest this element of the method claims.

Furthermore, the compounds in Marder are asserted to be of the general structure D-Π-A (donor-pi-acceptor) rather than D-Π-D as recited in the pending claims, and do not appear to fall within the generic structures recited in Claim 4 (or Claims 3-7). See Marder abstract, the

definition of "A" at cols. 2-3, and Claim 1 of Marder, and compare to the definitions of Da and Db here. Because Marder does not teach or suggest the elements of the generic compounds recited in the claims, Marder further cannot anticipate the claimed invention on these grounds.

As Marder lacks multiple elements of Claim 4 and the other method claims, Marder cannot anticipate the claimed invention. Withdrawal of the rejection is respectfully requested.

CONCLUSION

As the claims are believed in order for allowance, a notice to that effect is respectfully requested. Should the Examiner disagree, a telephonic interview is conditionally requested prior to the issuance of a subsequent Office Action so that any remaining issues can be discussed. The undersigned may be reached at (858) 587-7658.

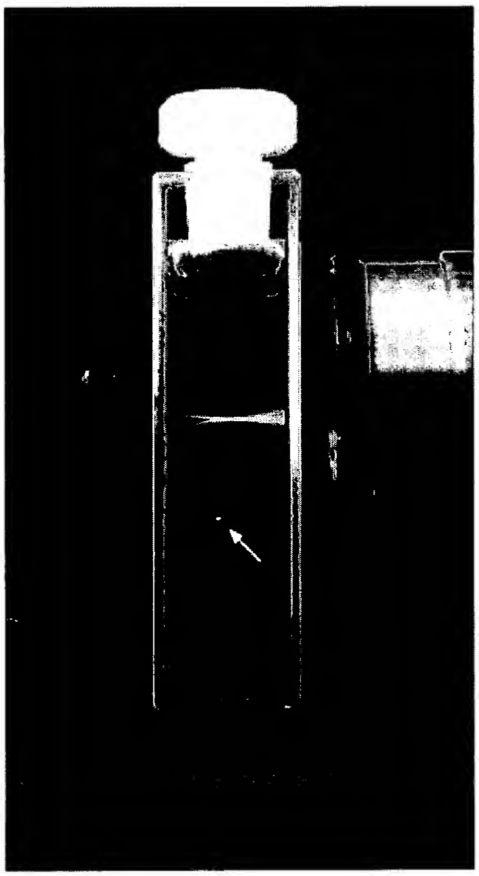
The Commissioner is hereby authorized to charge any underpayment or credit any overpayment associated with this communication to Deposit Account No. 22242 as necessary for this Response.

Respectfully submitted,

David Maher

David W. Maher
Reg. No. 40,077

APPENDIX A



Gallery Photograph

ID: G002088

High-Resolution

Low-Resolution

Gallery Area

- Multiphoton Excitation Microscopy

An experiment illustrating ordinary (single-photon) excitation of fluorescence and two-photon excitation. The cuvette contains a solution of the dye safranin O, which normally emits yellow light when excited by green light. The upper lens focuses green (543 nm) light from a CW helium–neon laser into the cuvette, producing the expected conical pattern of excitation (fading to the left). The lower lens focuses pulsed infrared (1046 nm) light from a neodymium–YLF laser. In two-photon absorption, the excitation is proportional to the square of the intensity; thus, the emission is confined to a small point focus (see arrow), which can be positioned anywhere in the cuvette by moving the illuminating beam. Image contributed by Brad Amos, Science Photo Library, London.